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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/890,871	08/07/2001	Tatsuya Nishimura	2001-1110-A	9174

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EXAMINER

WILKINS III, HARRY D

ART UNIT	PAPER NUMBER
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1742

DATE MAILED: 04/10/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/890,871

Applicant(s)

NISHIMURA ET AL.

Examiner

Harry D Wilkins, III

Art Unit

1742

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 16-34 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 16-34 is/are rejected.
- 7) ☒ Claim(s) 18, 20-27, 30 and 32 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 August 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3,4,5.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## **DETAILED ACTION**

### ***Claim Objections***

1. Claims 18 and 30 are objected to because of the following informalities: in line 3 of each of these claims "anode" is misspelled "anodee". Appropriate correction is required.
2. Claims 21-27 and 32 are objected to because of the following informalities: the phrase "a temperature of 100°C or more but the critical temperature of said influent or less" is not idiomatic English. The Examiner suggests the language read "a temperature of from 100°C to the critical temperature of said influent" or "a temperature in the range of 100°C to the critical temperature of said influent". Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:  

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
4. Claim 27 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
5. Claim 27 recites the limitation "the effluent" in line 6. There is insufficient antecedent basis for this limitation in the claim.

### ***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 16 and 21 rejected under 35 U.S.C. 102(b) as being anticipated by So et al (JP 09-215982).

So et al anticipate the invention as claimed. So et al teach (see abstract and figure) an electrolytic device for electrolyzing water with reducible substances (sewage) at high temperature and pressure, the device containing a reaction cell defining a chamber with a pair of electrodes (1 and 2). While there is no express disclosure of the ratio of the overall surface area of the electrodes to the volume of the chamber in So et al, the pair of electrodes (1 and 2) in So et al comprise (see claim 3 of English translation) a cylinder (1) and a cylindrical net (2). For cylinders, as long as the radius is kept below 10m, the ratio of the bottom surface area to the total volume will be at least  $0.05 \text{ m}^2/\text{m}^3$  ( $0.05\text{m}^2/1\text{m}^3 = \pi r^2 / (\pi r^2 h)$ , assuming that  $h=2*r$  yields  $r=10\text{m}$ . For  $r=1\text{m}$  the ratio would be  $0.5\text{m}^2/\text{m}^3$ ). The size of the treatment vessel inherently is smaller than 10m in radius because such a large size reactor would be too inefficient for moving and heating. Therefore, the treatment device of So et al inherently possess a ratio of the overall surface area of the electrodes to the volume of the chamber of at least  $0.05 \text{ m}^2/\text{m}^3$ .

Regarding claim 21, So et al teach (see Example on pages 6-8 of translation) that the method of operating the device was to input water with reducible substances (calcium chloride and sodium bicarbonate) into the device, apply a voltage into the reaction cell at a temperature greater than  $100^\circ\text{C}$  (see Table 1), and evacuate the

Art Unit: 1742

reaction cell to check for scales (solid precipitates) on the cell wall (anode) and cathode. The pressure is inherently kept high enough to ensure the water stayed in liquid form because the electrolytic reaction would not proceed if the water evaporated into a gaseous phase.

***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 17, 20, 22 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over So et al (JP 09-215982) in view of Yuasa et al (JP 09-117782).

The teachings of So et al are described above in paragraph no. 7.

So et al do not teach that the device had an inlet at the bottom and an outlet at the top.

Yuasa et al teach (see English abstract) a method of treating waste water at high temperature and pressure. Thus, the device of Yuasa et al is closely related to the problems of So et al. Therefore Yuasa et al is considered to be analogous art. Yuasa et al teach a device for the continuous treatment of waste water that includes a reaction chamber (6) with an inlet at the bottom and an inlet at the top.

Therefore, it would have been obvious to one of ordinary skill in the art to have applied the method of So et al to the device of Yuasa et al in order to make the treatment method of So et al continuous.

Regarding claim 20, Yuasa et al teach that a pump (2) was used to supply the influent at high pressure and an effluent line to discharge the treated water from the reaction chamber (6). Yuasa et al teach (see English abstract) that oxygen is added to the influent by an oxygen generator (3). Oxygen in an oxidizer, thus, the line for adding the oxygen is an "oxidizer line" that supplies oxygen to the reaction chamber by means of the influent. Therefore, it would have been obvious to one of ordinary skill in the art to have applied the method of So et al to the device of Yuasa et al in order to make the treatment method of So et al continuous.

Regarding claims 22 and 25, So et al teach (see Example on pages 6-8 of translation) that the method of operating the device was to input water with reducible substances (calcium chloride and sodium bicarbonate) into the device, apply a voltage into the reaction cell at a temperature greater than 100°C (see Table 1), and evacuate the reaction cell to check for scales (solid precipitates) on the cell wall (anode) and cathode. The pressure is inherently kept high enough to ensure the water stayed in liquid form because the electrolytic reaction would not proceed if the water evaporated into a gaseous phase.

10. Claims 18 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over So et al (JP 09-215982) in view of Gilchrist (US 3,798,150).

The teachings of So et al are described above in paragraph no. 7.

So et al do not teach that the device had two or more tubular reaction cells having a metal inner well serving as a cathode and an anode is provided in each of the reaction cells.

Gilchrist teaches (see Figs. 6-9 and col. 6, line 33 to col. 7, line 51) a reaction cell system that includes multiple tubular electrolytic cells (72 and 92) that have anodes disposed therein.

Therefore, it would have been obvious to one of ordinary skill in the art to have applied the method of So et al to the device of Gilchrist in order to make the treatment method of So et al continuous and to increase the amount of contact area of the waste water with the electrodes as provided for by the tubular electrode set up of Gilchrist (see Gilchrist at col. 2, lines 11-13).

Regarding claim 23, So et al teach (see Example on pages 6-8 of translation) that the method of operating the device was to input water with reducible substances (calcium chloride and sodium bicarbonate) into the device, apply a voltage into the reaction cell at a temperature greater than 100°C (see Table 1), and evacuate the reaction cell to check for scales (solid precipitates) on the cell wall (anode) and cathode. The pressure is inherently kept high enough to ensure the water stayed in liquid form because the electrolytic reaction would not proceed if the water evaporated into a gaseous phase.

11. Claims 19 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over So et al (JP 09-215982) in view of Stralser (US 3,975,247).

The teachings of So et al are described above in paragraph no. 7.

So et al do not teach that the device had two electrodes, each having two or more cylindrical walls as claimed.

Stralser teaches (see Figs. 4 and 5 and col. 6, line 53 to col. 7, line 9) such a device. The first electrode (comprising 26 and 28) had two concentric cylinder walls and the top of the cell connected the two walls to each other. The second electrode (comprising 27 and 29) had two concentric cylinder walls and the bottom of the cell connected the two walls to each other. The walls are arranged alternating with each other to form a channel for influent between the first electrode walls and the second electrode walls.

Therefore, it would have been obvious to one of ordinary skill in the art to have applied the method of So et al to the device of Stralser in order to make the treatment method of So et al continuous and to increase the amount of contact area of the waste water with the cathode and anode to provide higher current emission as provided for by the electrode set up of Stralser (see Stralser at col. 6, lines 53-57).

Regarding claim 24, So et al teach (see Example on pages 6-8 of translation) that the method of operating the device was to input water with reducible substances (calcium chloride and sodium bicarbonate) into the device, apply a voltage into the reaction cell at a temperature greater than 100°C (see Table 1), and evacuate the reaction cell to check for scales (solid precipitates) on the cell wall (anode) and cathode. The pressure is inherently kept high enough to ensure the water stayed in liquid form because the electrolytic reaction would not proceed if the water evaporated into a gaseous phase.

12. Claims 26, 32 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over So et al (JP 09-215982) in view of Pitara et al (SU 962212).



The teachings of So et al are described above in paragraph no. 7.

So et al do not teach that conductive particles were added to the influent.

Pitora et al teach (see Derwent abstract) that waste containing organic compounds was treated in a layer of granulated electrically conductive material that was located between two electrodes in a field.

Therefore, it would have been obvious to one of ordinary skill in the art to have adapted the method of So et al to include the addition of conductive particles as taught by Pitara et al because Pitara et al teach (see Derwent abstract) that the conductive particles provide a higher degree of purification of the waste water and a lower power consumption.

Regarding claim 32, So et al teach a method of subjecting an influent of water and reducible substances to electrolysis at a temperature above 100°C and at a pressure such that the water remains a liquid as discussed above in paragraph no. 7. It would have been obvious to one of ordinary skill in the art to have added conductive particles as taught by Pitara et al to the influent in order to facilitate the purification process and to reduce power consumption as disclosed by Pitara et al.

Regarding claim 33, though So et al do not teach adding an acid to the influent, So et al do teach (see pages 4-5 of translation, under "[Mode of Working the Invention]") that the acid ( $H^+$ ) formed at the anode prevents the formation of a scale on the anode by causing the degradation of calcium carbonate. Therefore, it would have been obvious to one of ordinary skill in the art to have added acid to the influent in order to cause the

Art Unit: 1742

degradation of the calcium carbonate and thus prevent the formation of a scale on the electrodes.

13. Claims 27-29 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over So et al (JP 09-215982) in view of Pitara et al (SU 962212) as applied to claim s 26, 32 and 33 above, and further in view of Hess et al (US 3,652,405).

So et al in view of Pitara et al do not expressly teach a separator being used to remove the conductive particles from the effluent stream.

However, because the goal of the process/apparatus of So et al is the purification of water, it would have been obvious to one of ordinary skill in the art to have added means for separating out the conductive particles because they would not be desired in the final pure water product.

A routineer in the art would have looked to conventional means for separating out the conductive particles, such as those disclosed by Hess et al (see figure and col. 2, lines 42-45) that a slurry (solid particles suspended in a liquid) was separated by means such as a filter or cyclone.

Regarding claims 28 and 29, Hess et al teach that the separating means were either a filter or a cyclone. Thus, it would have been obvious to use one of the conventional means disclosed by Hess et al in order to separate out the conductive particles to have created a more pure final water effluent.

Regarding claim 34, as above it would have been obvious to one of ordinary skill in the art to have separated the conductive particles of the effluent in order to provide a more pure product water stream by utilizing the separating means described by Hess et

Art Unit: 1742

al. It would have been within the expected skill of a routineer in the art to have recycled the conductive particles in order to avoid waste because the particles are not deteriorated by participating in the electrolysis reaction.

14. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over So et al (JP 09-215982) in view of Pitara et al (SU 962212) and Hess et al (US 3,652,405) as applied to claims 27-29 and 34 above, and further in view of Gilchrist (US 3,798,150).

So et al do not teach that the device had two or more tubular reaction cells having a metal inner well serving as a cathode and an anode is provided in each of the reaction cells.

Gilchrist teaches (see Figs. 6-9 and col. 6, line 33 to col. 7, line 51) a reaction cell system that includes multiple tubular electrolytic cells (72 and 92) that have anodes disposed therein.

Therefore, it would have been obvious to one of ordinary skill in the art to have applied the method of So et al to the device of Gilchrist in order to make the treatment method of So et al continuous and to increase the amount of contact area of the waste water with the electrodes as provided for by the tubular electrode set up of Gilchrist (see Gilchrist at col. 2, lines 11-13).

15. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over So et al (JP 09-215982) in view of Pitara et al (SU 962212) and Hess et al (US 3,652,405) as applied to claims 27-29 and 34 above, and further in view of Stralser (US 3,975,247).

So et al do not teach that the device had two electrodes, each having two or more cylindrical walls as claimed.

Art Unit: 1742

Stralser teaches (see Figs. 4 and 5 and col. 6, line 53 to col. 7, line 9) such a device. The first electrode (comprising 26 and 28) had two concentric cylinder walls and the top of the cell connected the two walls to each other. The second electrode (comprising 27 and 29) had two concentric cylinder walls and the bottom of the cell connected the two walls to each other. The walls are arranged alternating with each other to form a channel for influent between the first electrode walls and the second electrode walls.

Therefore, it would have been obvious to one of ordinary skill in the art to have applied the method of So et al to the device of Stralser in order to make the treatment method of So et al continuous and to increase the amount of contact area of the waste water with the cathode and anode to provide higher current emission as provided for by the electrode set up of Stralser (see Stralser at col. 6, lines 53-57).

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry D Wilkins, III whose telephone number is 703-305-9927. The examiner can normally be reached on M-Th 6:00am-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy V King can be reached on 703-308-1146. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Application/Control Number: 09/890,871  
Art Unit: 1742

Page 12

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Harry D Wilkins, III  
Examiner  
Art Unit 1742

hdw  
April 4, 2003

  
**ROY KING**  
**SUPERVISORY PATENT EXAMINER**  
**TECHNOLOGY CENTER 1700**